

## A High Flux Source of Swift Oxygen Atoms

M. Fink, D.A. Kohl, J.W. Keto and P. Antoniewicz  
The University of Texas at Austin  
Austin, Texas 78712

A source of swift oxygen atoms is described which has several unique features. A high current ion beam is produced by a microwave discharge, accelerated to 10 keV and the mass selected by a modified Dupont 21-110 mass spectrometer. The  $O^+$  beam exiting the mass spectrometer is focused into a rectangular shape with an energy spread of less than one eV. The next section of the machine decelerates the ion beam into a counterpropagating electron beam in order to minimize space charge effects. After deceleration, the ion beam intersects at  $90^\circ$ , a neutral oxygen atom beam, which via resonant charge exchange produces a mixture of  $O^+$  and  $O$ . Any remaining  $O^+$  are swept out of the beam by an electric field and differentially pumped away while the desired  $O$  beam, collimated by slits, impinges on the target. In situ monitoring of the target surface is done by XPS or Auger Spectroscopy. Faraday cups provide flux measurements in the ion sections while the neutral flux is determined by a special torsion balance or by a quadrupole mass spectrometer specially adapted for swift atoms. While the vacuum from the source through the mass spectrometer is maintained by diffusion pumps, the rest of the machine is UHV.